

CLAIMS

What is claimed is:

1. A self-encoding analytic chemical sensor array comprising:
 - a) a substrate with a surface comprising discrete sites; and
 - 5 b) a population of microspheres comprising at least a first and a second subpopulation, wherein each subpopulation comprises at least one reporter dye;wherein each subpopulation emits a first characteristic optical response signature when subjected to excitation light energy in the presence of a
10 reference analyte;
wherein said microspheres are distributed on said surface.
2. A sensor array according to claim 1 wherein each subpopulation further comprises a bioactive agent.
3. A sensor array according to claim 1 or 2 wherein the reporter dye
15 comprises a fluorescent dye.
4. A sensor array according to claim 1 or 2 wherein the reporter dye comprises a solvatochromic dye.
5. A sensor array according to claim 4 wherein the solvatochromic dye comprises Nile Red.
- 20 6. A sensor array according to claim 1, 2, 3, 4 or 5 wherein the beads are encoded with a predetermined ratio of at least two reporter dyes.
7. A sensor array according to claim 2 wherein said bioactive agent is selected from the group consisting of nucleic acids and proteins.

8. A sensor array according to claims 1, 2, 3, 4, 5, 6 and 7 wherein said substrate is a fiber optic bundle and said surface is a proximal end of said bundle.
- 5 9. A sensor array according to claims 1, 2, 3, 4, 5, 6, 7 and 8 further comprising an excitation light energy source in optical communication with said proximal end.
10. A sensor array according to claims 1, 2, 3, 4, 5, 6, 7, 8 and 9 further comprising an emission light energy detection means in optical communication with said proximal end.
- 10 11. A method of detecting a target analyte in a sample comprising:
a) contacting said sample with an sensor array comprising:
i) a substrate with a surface comprising discrete sites; and
ii) a population of microspheres comprising at least a first and a second subpopulation, each subpopulation comprising:
15 1) a bioactive agent; and
2) at least one reporter dye;
wherein said reporting dye has a first characteristic optical response signature when subjected to excitation light energy in the presence of a reference analyte;
20 wherein said microspheres are distributed on said surface;
b) detecting the presence of said analyte.
12. A method according to claim 11 further comprising identifying the location of each bioactive agent on said substrate by adding said reference analyte.
- 25 13. A method according to claim 11 or 12 wherein said detecting is done by detecting the presence of a label attached to said target analyte.

14. A method of decoding an array composition comprising
- a) providing an array composition comprising:
- 5 i) a substrate with a surface comprising discrete sites; and
- ii) a population of microspheres comprising at least a first and a
- second subpopulation, wherein each subpopulation comprises at
- least one reporter dye;
- wherein said reporting dye has a first characteristic optical response
- signature when subjected to excitation light energy in the presence of a
- reference analyte;
- 10 wherein said microspheres are distributed on said surface; and
- b) adding at least one reference analyte to said array composition to
- identify the location of at least one subpopulation.
15. A method according to claim 14 wherein the location of each
- subpopulation is determined.